Contents and schedule for Spring 2021 Civil Engineering Models Laboratory (土實)

Instructors' kickoff meeting, 2021/01/05

1. Semester contents

Project component	Civil Engineering Models Laboratory (土實)		Other connected courses this semester
	Structure	**Automation**	
Roller coaster track	Design and build a 3D roller track using soldered copper rods on a simple stand made of square section wood pieces	Model track geometry and roller motion Capture roller travel times using Arduino	Applied mech 2 (rigid body dynamics) Eng math 2 (ODE) Computer progr. (loop)
Shaken aluminum tower	Design and build a multistory 3D tower using jet-cut aluminum and M2 bolts Conduct non-destructive and destructive tests of the tower	Design and build a forced vibration structural testing system using Arduino-controlled motors and accelerometer	Applied mech 2 (spring-connected bodies) Eng math 2 (ODEs system) Computer progr. (data processing)

Suggested team size: 4 students per team so they can work all together or in subteams of 2 students depending on the tasks.

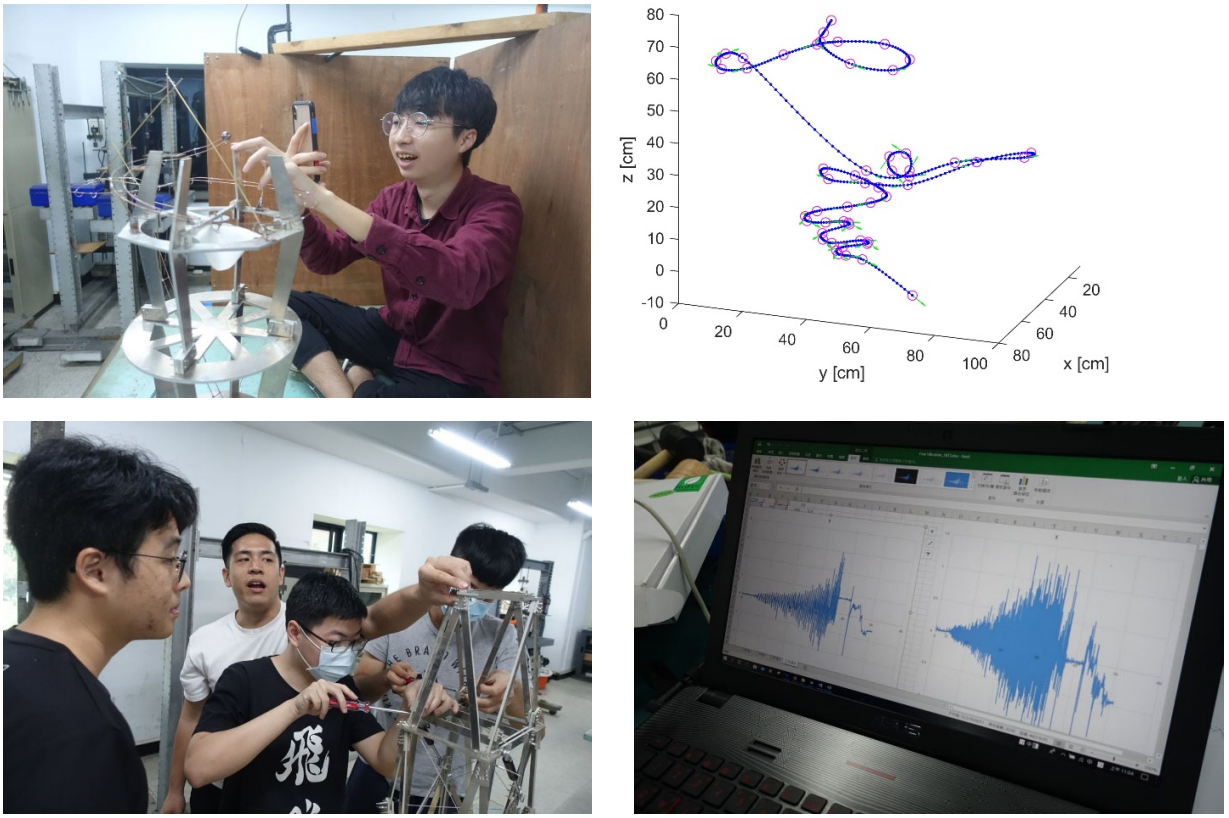

Figure 1: Four components of the semester course. Top left: design-build a 3D roller coaster; top right: model and measure the roller dynamics; bottom left: design-build an aluminum tower; bottom right: conduct and instrument shaking tests.

2. Semester schedule for Civil Engineering Models Laboratory (土實)

Week	Class activity	Location
1/2	Build a simple 2D test track using soldered copper	S-Lab
2/1	Capture roller travel times using Arduino	V-Lab
3/4	Design review and start fabrication of 3D track prototype	S-Lab
4/3	Model track geometry and roller motion using computer progr.	V-Lab
5	Fabrication and troubleshooting	V-Lab and S-Lab
6	No class on April 1-2	
7	Roller coaster track midterm jury	TBD
8/9	Aluminum structure fabrication practice	S-Lab
9/10	Structural design review and detailing tutorial	V-Lab
10/11	Motor-driven shaker fabrication and testing	S-Lab
11/12	Final structural review and OMAX path-setting tutorial	V-Lab
12/13*	Start fabrication of tower prototype	S-Lab
13/14	Accelerometer signal acquisition and processing	V-Lab
14/15	Structural testing and signal acquisition	S-Lab
16	Shaken aluminum tower final jury	TBD

Blue = structure; yellow = automation; green = simultaneous or together

*Note: because time will be short for the aluminum jet-cutting, consider letting an external company take care of part of the cutting

3. Class schedule and instructors

Time	Thur. 234	Fri. 234	Fri. 789	Thur. 234	Fri. 234	Fri. 789
Class	1A	2A	3A	1B	2B	3B
Structure instructor	卡艾瑋	卡艾瑋	許聿廷	許聿廷	朴艾雪	朴艾雪
Automation instructor	張書瑋	張書瑋	朱致遠	朱致遠	汪立本	汪立本

4. Modules for which coordination will be sought with other courses

Target week*	Module	Course
3	Learn to model a rolling body on a curved track	Applied mech 2 and/or eng math 2 and/or computer programming
12	Learn to model the free and forced vibrations of a MDOF system	Applied mech 2 and/or eng math 2 and/or computer programming

*To be adjusted based on course schedule of each section.